

Socioeconomic determinant of microdose adoption and impact on food security and household incomes

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Introduction

- From FAOSTAT (2011) in the last decade the average yield

- Pearl millet :

– **448kg/ha** in Sahel (Niger)

– **588kg/ha** developing
countries,

– **858kg/ha** in the world

- Sorghum

– **315kg/ha** in Sahel (Niger)

– **741kg/ha** in developing
countries,

– **1366 kg/ha** in the world

- Thus, increasing productivity of rainfed crops is a necessity.

RESEARCH QUESTIONS

1. What are the actual and potential adoption rates and determinants of fertilizers microdose and rain water harvest technologies in sahel for households and by gender?
2. What are the impacts of fertilizers microdose and rain water harvest technologies on income by gender and household's food security in sahel?

Objectives

- Determine and explain factors affecting adoption of micro-dosing by women and men
- Estimate profit realized by both women and men farmers who adopt the fertilizer microdosing and rainwater harvesting
- Analyze the effect of microdosing and rainwater harvesting adoption on food consumption in the household.

The microdose and RWH techniques?

- Fertilizer micro-dosing is the localized placement of small amounts of mineral fertilizer in the planting hole at sowing, or at the base of newly emerged plants, instead of spreading fertilizers evenly across the field
- Rainwater harvesting encourages infiltration of rainwater and increases soil moisture levels



Farmers field demonstrations finding



**Recommended
dose**

Microdose

Check

Methodology

- Data for on-farm evaluation are been collected from all farmers participating in on-farm experimentation: 200
- Survey: 400 household
- Economic analysis of on-farm trials data using partial budgeting
- Statistic analysis
 - Khi square
 - T test
 - Descriptives statistics
 - Linear regression



Stone row, Photo: Zougmore, Niger



Stone row + OM, Photo: Zougmore, Niger



Stone row, Photo: Zougmore, Niger



Stone row + Residues, Photo: Zougmore, Niger



2007/06/26

Women realizing half moon, Photo: Badiori, Burkina Faso

Comparison of maize income coming from integrated microdose fertilizing and RWH in Benin (2011-2013)

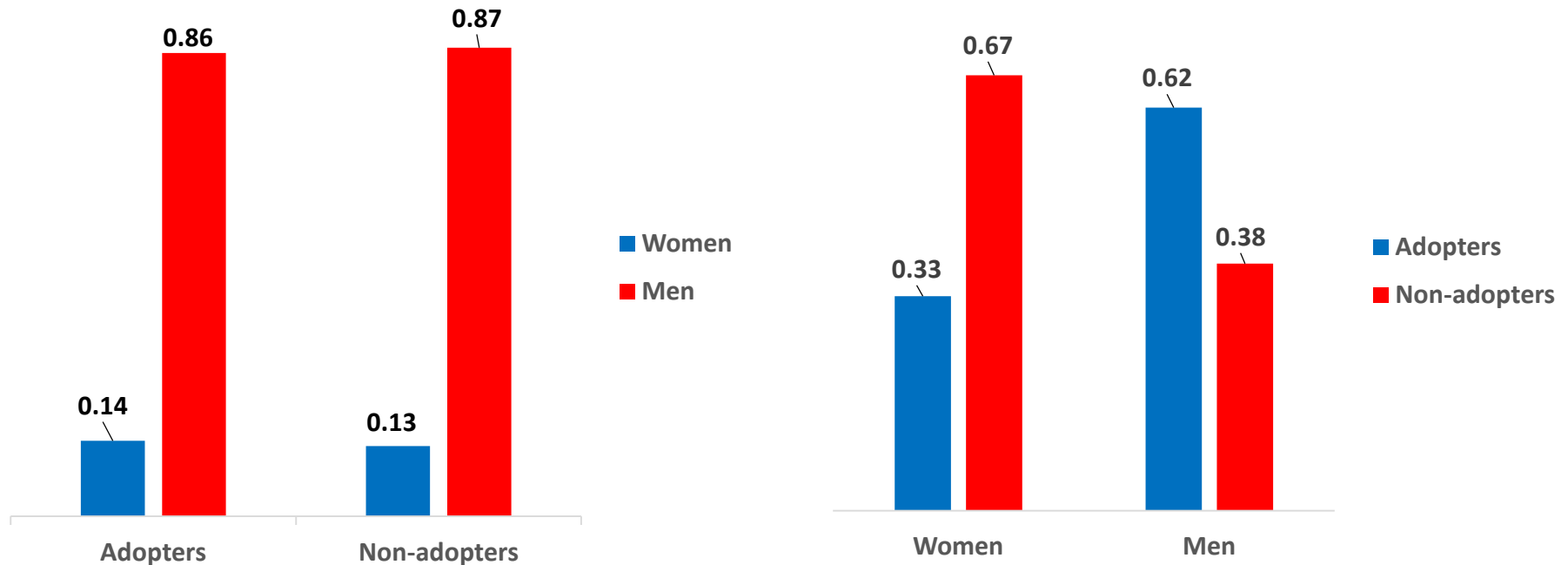
- Ption cost CFA/ha: MD (29760); compared to RD (48000 CFA) 61%
- Le SR and CLP combined to Microdose show the best B/C rate

Fertilization	Microdose		Recommended	
	N B (CFA)	B/C	MB (CFA)	B/C
RHW technique				
Flat Ploughing	276280	1.70	311037	1.58
Tied Ridges	265863	1.49	289289	1.31
Stone Rows	338954	2.17	367995	1.94
Contour line ploughing	291979	1.84	320094	1.64
Perpendicular ploughing	213221	1.11	239728	1.01
Moyenne	277259	1.66	305629	1.50

Economic effects on sorghum of microdose + RWH in Burkina Faso

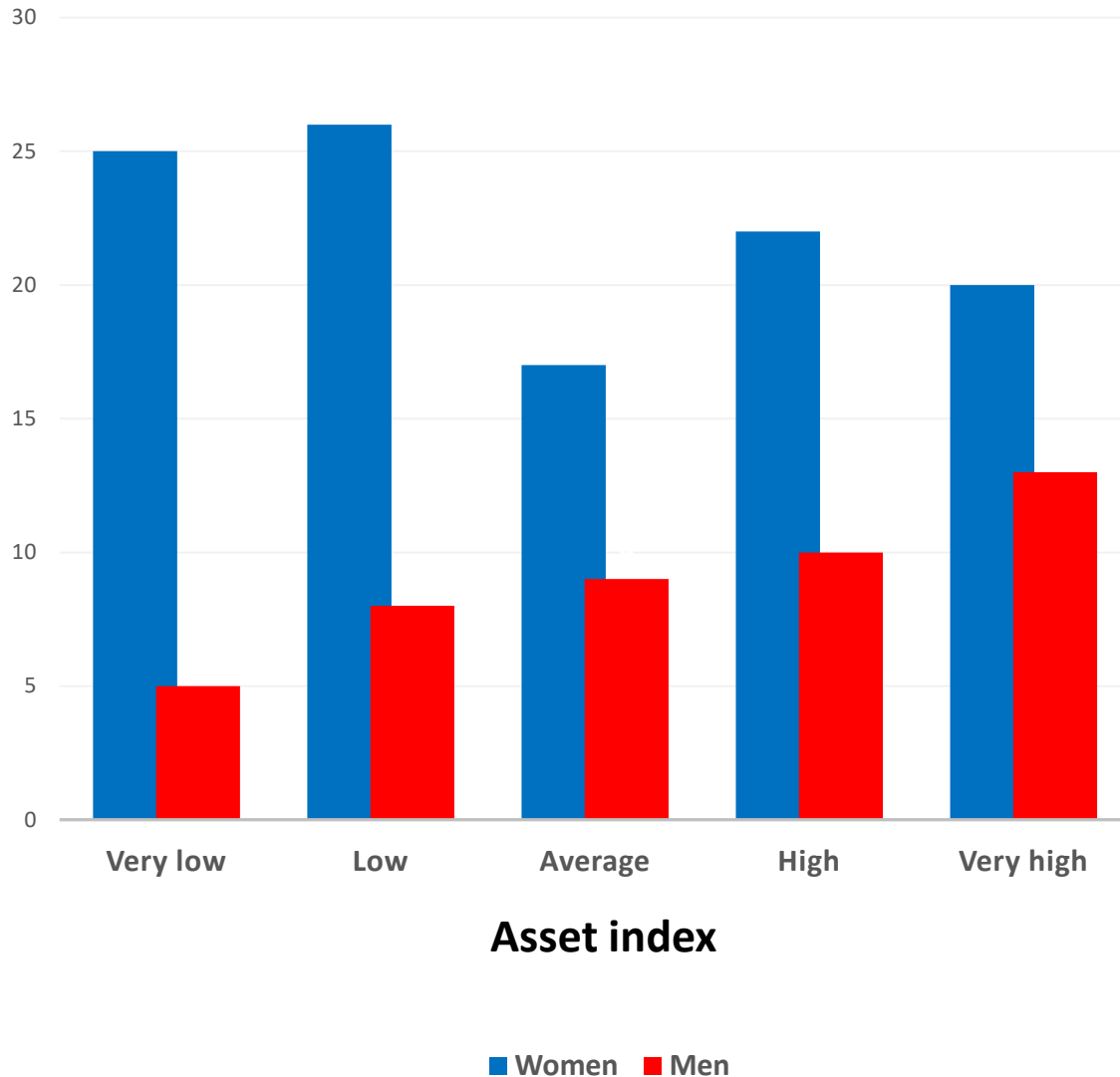
	Labors (man days)	Production cost (CFA)	Net benefit (CFA)	Ration B/C
Microdose without RWH	7	31125	142625	4.5
Microdose + RWH	43	43625	294375	6.7
RWH	37	13250	72300	5.4

Gender and adoption of micro-dosing



- Among adopters, women represent 14%
- Among women, adopters represents more than 50% of adopters.

Proportion of land affected to micro dosing technique



Women allocate, in percentage, more land for micro dosing technique than men

Socioeconomics characteristics of adopters and non- adopters

Variables		Adopters (%)	Non adopters (%)	Test
Gender	Male	76	91	$\chi^2 = 20,605$ $p = 0,00^{***}$
	Female	24	9	
Education	Any	47	47	$\chi^2 = 76,161$ $p = 0,00^{***}$
	None formal	40	31	
	Primary school	9	17	
	Secondary	4	1	
Age (years)		47	45	$t = 0,817$; $p = 0,415$
Family size		13	12	$t = 2,2$; $p = 0,03^{**}$
Size of farm cultivated (Ha)		6	4	$t = 5,45$; $p = 0,00^{***}$

There are some differences among adopters and non-adopters

Determinants of micro dosing adoption by gender

Variables	Men		Women	
	Coef	T-test	Coef	T-test
Age	0,003	0,012	-0,055	0,834**
Education	-0,065	0,173**	-0,748	0,8
Household size	0,031	0,037**	0,191***	1,290
Food shortage	-1,18	0,017	-0,183	0,392***
Perception of soil degradation	0,354	0,268**	-1,14	0,962
Size of farm cultivated	0,083	0,052***	-0,094	0,333***
Size of farm fertilized	0,083	0,052**	4,636	5,538**
Fallow practice	0,104	0,313	1,610	0,909
Constant	0,04	1,269***	0,583	0,021***
Model	F= 69,8; p= 0,00 R2= 0,32		F=55, 69; p= 0,00 R2= 0,26	

Among men, education, household size, perception of soil degradation, size of farm cultivated affect adoption

Among women, age, length of food shortage, size of farm cultivated affect adoption

Adoption rate of microdose by gender

	Bénin	Burkina Faso
Female	11%	32%
Male	19%	46%



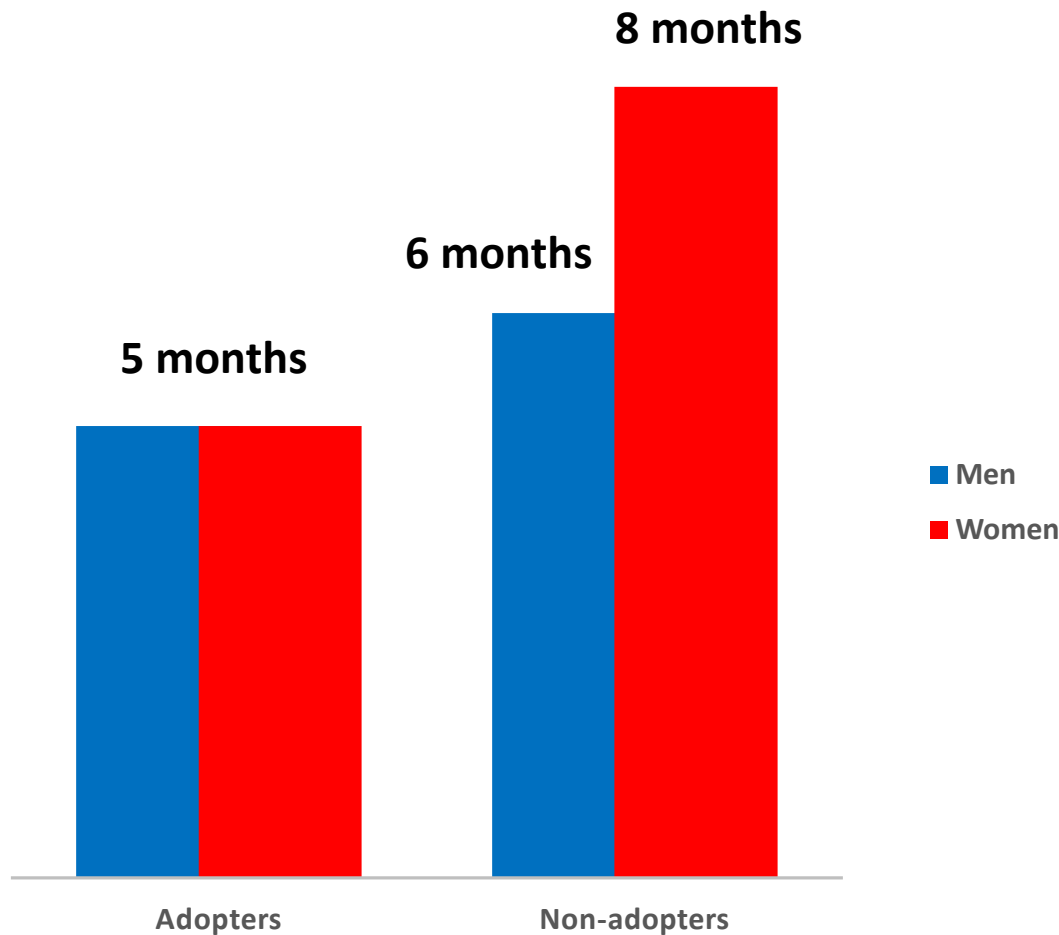
- Difference country: long tradition in microdose, developed warrantage system, more organization dealing with access to input
- Difference between gender: more assets, more access to input (cotton)
- For more adoption, warrantage show a significant contribution to better adoption of microdose

Warrantage

- Multi-acteurs system
- Farmer's organization obtain credit by putting together their harvest as a guaranteed stock
- Commercialization was made when the prize become competitive

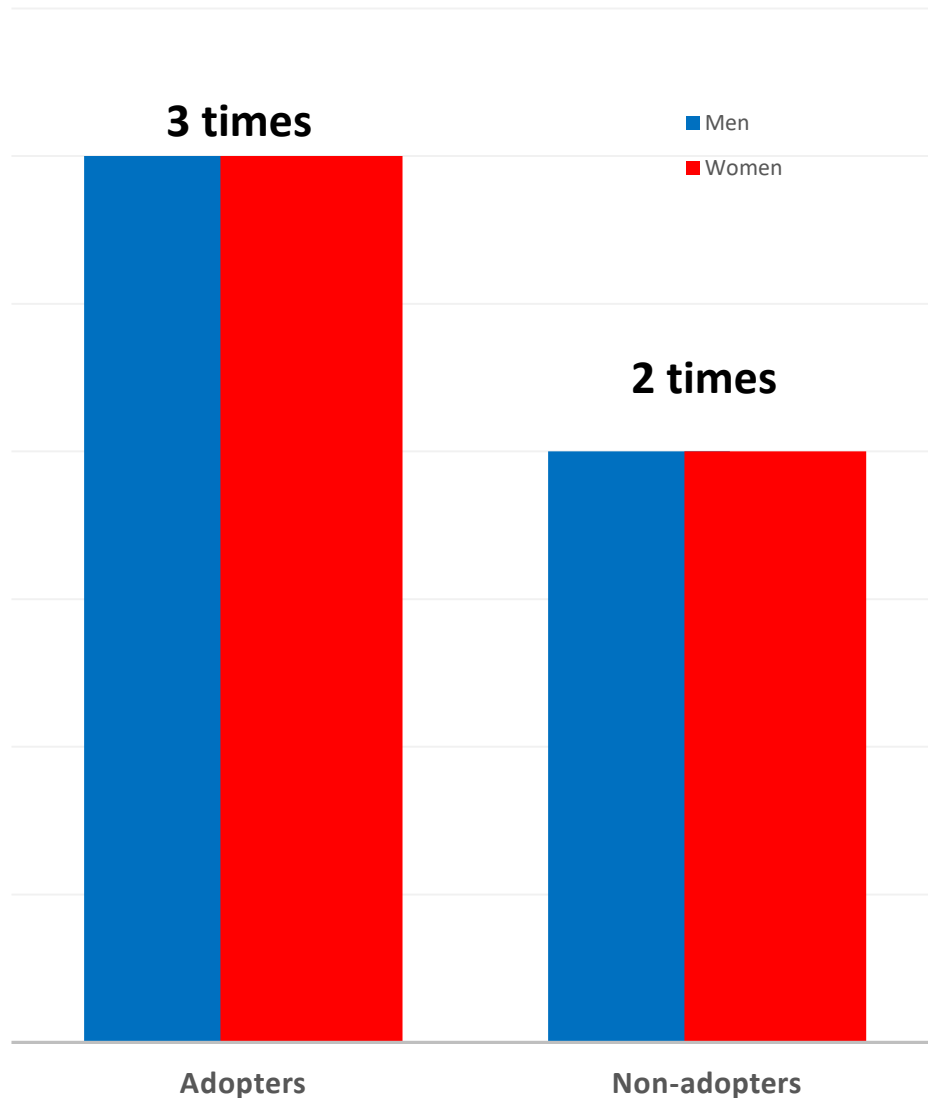


Impact of adoption on food security



Micro-dosing technique adoption reduce the length of food shortage for 1 month among men and 3 months among women

Impact of adoption on food security



Adoption of micro dosing technique help to eat one more time per day

Conclusions

- Adoption of micro-dosing can help poor rural men and women to increase yield by 44-120% and net profit by 50 to 130% in comparison with farmers practices.
- The more households adopt microdosing and rainwater harvesting techniques, the fewer there are food shortages.
- Women are allocating more land to micro-dosing than men with similar levels of assets (Figure) across all four project countries
- Adopting the combined techniques in sorghum production has led to their application in other rainfed crops grown by women, such as cowpea and cereals

Conclusions

- The use of fertilizer is limited to cash crops such as cotton. Public and private sector should not only provide fertilizer to farmers for cash crops but also make it available and affordable to food crops as well as a sound strategy to increase food security and the well-being of poor rural women and men in the Sahel





Thank for your attention!